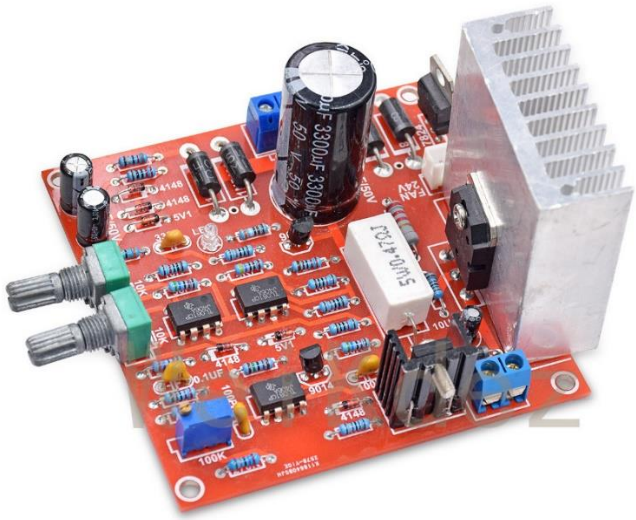
WeiKedz 0-30V 2mA-3A Adjustable DC Regulated Power Supply DIY Kit

Assembly Manual



The WeiKedz Adjustable DC Regulated Power Supply is a high-quality product that, when paired with an appropriately sized transformer, provides continuously variable output voltage between 0 and 30V and continuously variable output current between 2mA and 3A. This power supply is an indispensable tool for circuit design, experimenting, and testing work. The current limiting feature is especially important when used properly as it can prevent simple wiring mistakes from destroying circuit components, which saves time and money.

Technical specifications:

Input voltage:	24VAC
Input current:	3A DC (max)
Output voltage:	0 to 30VDC (adjustable)
Output current:	2mA to 3A DC (adjustable)
output voltage ripple:	0.01% (max)

Power Supply Features:

- All through-hole components. Assembly, troubleshooting, and repair is easy.
- Easily adjustable output voltage and current.
- LED indicates when current limit is triggered.
- Current limit prevents wiring errors or component malfunctions from destroying the circuit being powered.

Power Supply Assembly Instructions

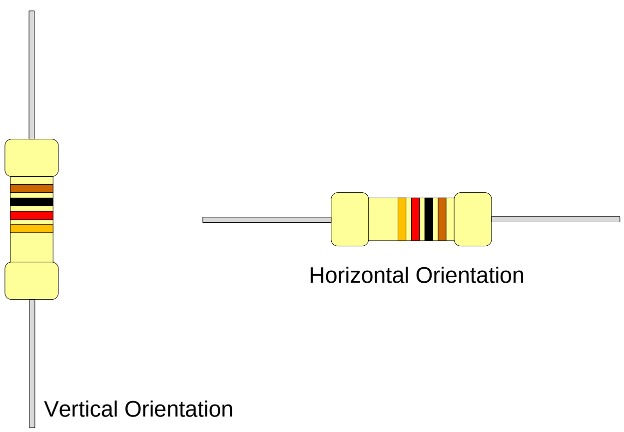
Read This Before You Begin

1. Hold the PCB by the edges and avoid touching the PCB pads with your fingers until you are ready to assemble. Dirt and oils from your hands can make soldering difficult resulting in weak joints.

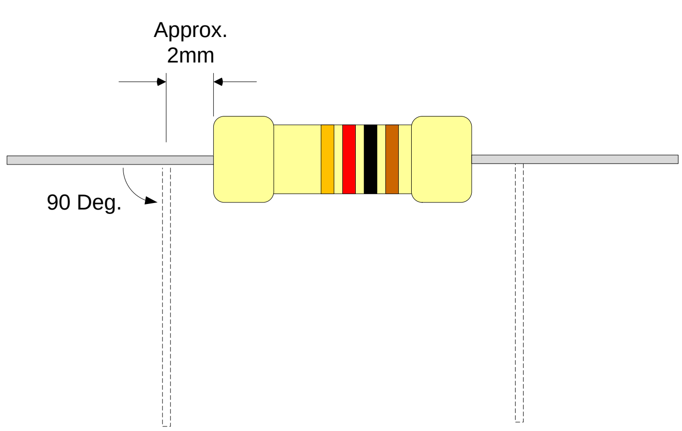
2. Before you begin soldering, lightly wipe both sides of the board with a micro-fiber cloth to remove any contaminants that may have ended up on the board during packaging. Avoid dragging the cloth across the board edges.

3. **Soldering fixed resistors**

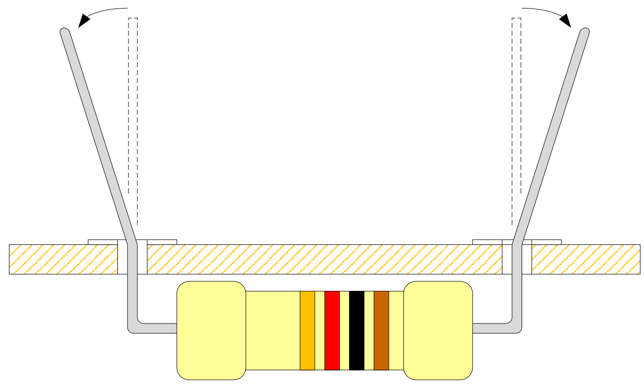
   A. Although it's not absolutely required, the project will look nicer and part values are easier to read if resistor color codes are oriented the same direction for horizontal and vertical orientations as indicated in the illustration below. It's your choice which direction to use as long as you are consistent.



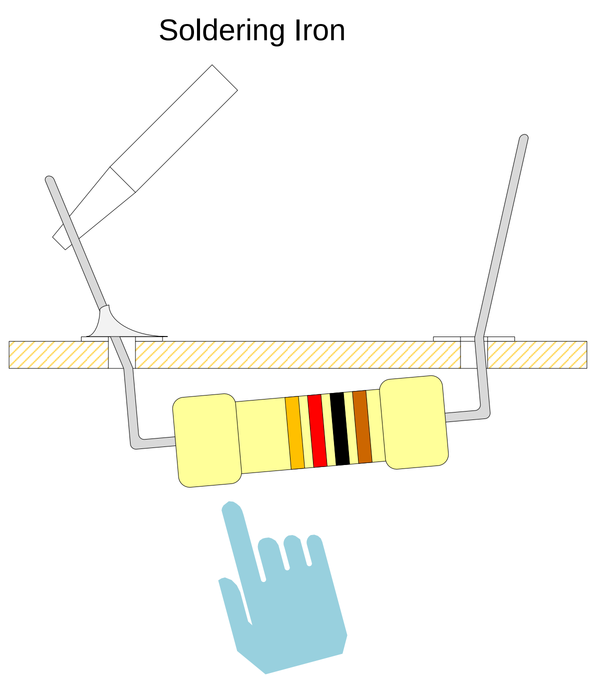
   B. Bend fixed resistor leads approximately 2mm from the resistor body at a 90 degree angle. You want the fixed resistor lead spacing to be just slightly longer than the PCB hole spacing so the resistor stays in place when fully seated against the board. This will make leads easier to solder.



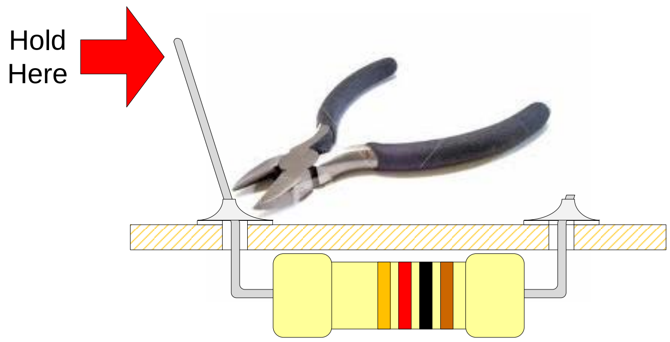
C. If the resistor is loose and tends to fall out when you turn the board over to solder, bend the leads out a 30 degree angle so that the resistor is trapped against the PCB.



D. Solder one resistor lead to the PCB first, then check that the resistor is fully seated against the board. If the resistor is fully seated, solder the other lead. If it isn't, push lightly against the resistor body while applying the soldering iron to the soldered resistor lead so that the solder melts and the resistors seats against the board. Then solder the remaining lead. <u>Be careful not to burn your finger as the resistor will get hot while soldering.</u>

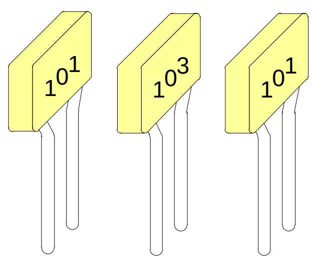


E. Clip the resistor leads flush with wire cutters using one hand while holding the lead being cut with the other hand. This will prevent sharp wire bits from flying around the room and becoming an eye hazard.

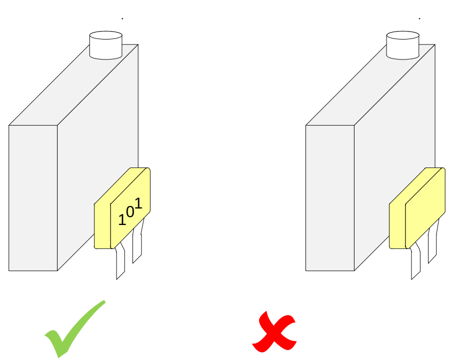


4. Soldering Multi-Layer Ceramic Capacitors (MLCC)

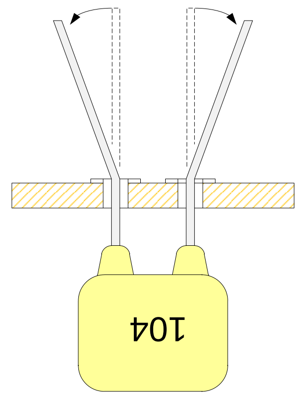
A. Although it's not absolutely required, the project will look nicer and parts are easier to read if capacitor values face the same direction for horizontal and vertical orientations as indicated in the illustration below. <u>MLC capacitors do not have a polarity</u> so it's your choice which direction you install them.



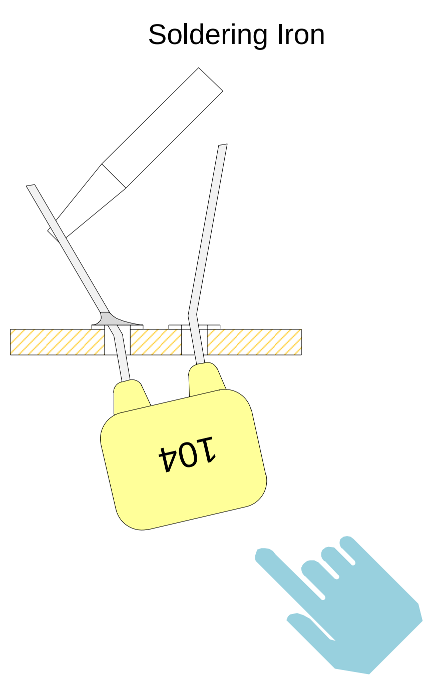
B. The exception to the suggestion above is when an MLC capacitor is close to a variable resistor, transistor, or other component that obscures one side of the capacitor. Try to orient the capacitor so that the capacitor value can be seen.



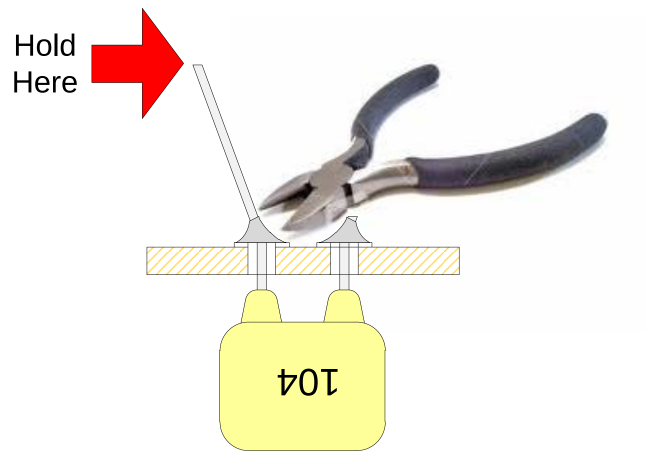
C. Insert the MLC capacitor into the circuit board and bend the leads out a 30 degree angle so that the capacitor is trapped against the PCB. Leave the coated portion of the leads above the circuit board.



D. Solder one capacitor lead to the PCB first, then check that the capacitor is properly seated on the board. If the capacitor is properly seated, solder the other lead. If it isn't, push lightly against the capacitor body while applying the soldering iron to the soldered capacitor lead so that the solder melts and the capacitor seats properly on the board. Then solder the remaining lead. Be careful not to burn your finger as the capacitor will get hot while soldering.

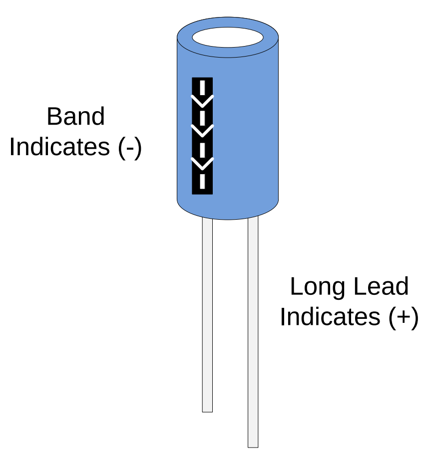


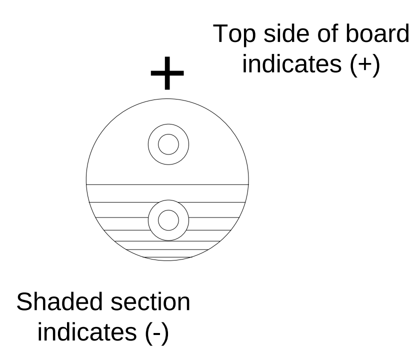
E. Clip the capacitor leads flush with wire cutters using one hand while holding the lead being cut with the other hand. This will prevent sharp wire bits from flying around the room and becoming an eye hazard.



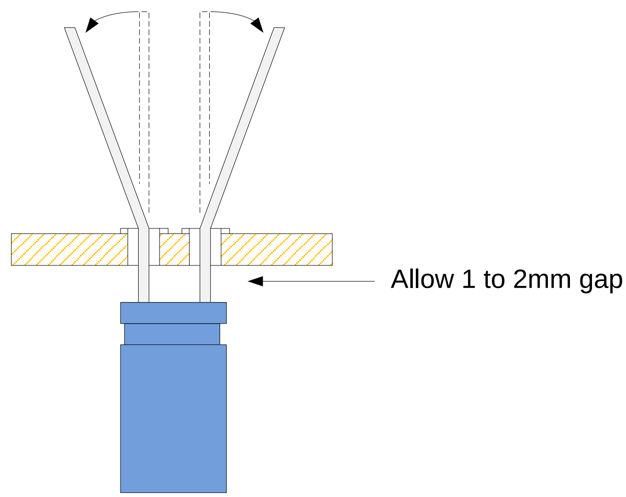
5. Soldering Electrolytic Capacitors

A. Electrolytic capacitors have a polarity that must be observed or the device can self-destruct when power is applied. New capacitors are shipped with one lead longer than the other. The long lead indicates the positive (+) terminal of the capacitor. The capacitor will also have a band on its body that indicates the negative (-) lead. The PCB will denote which lead goes into which hole. The component side of the board will denote the part value and a (+) polarity marking near the hole where the (+) lead on the capacitor will go. <u>Check and double-check capacitor polarity before soldering</u>.

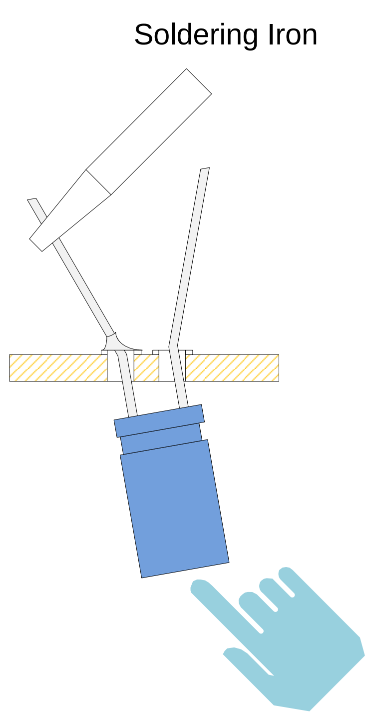




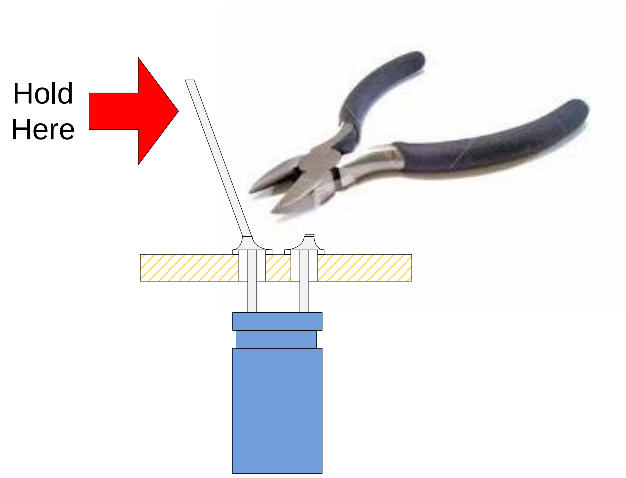
B. Insert the electrolytic capacitor into the circuit board and bend the leads out a 30 degree angle so that the capacitor is trapped against the PCB. Leave 1 to 2mm of lead length above the circuit board. This reduces the possibility of stress related seal failure at the component leads that could result in electrolyte leakage and capacitor failure later on.



C. Solder one capacitor lead to the PCB first, then check that the capacitor is properly seated on the board. If the capacitor is properly seated, solder the other lead. If it isn't, push lightly against the capacitor body while applying the soldering iron to the soldered capacitor lead so that the solder melts and the capacitor seats properly on board. Then solder the remaining lead.

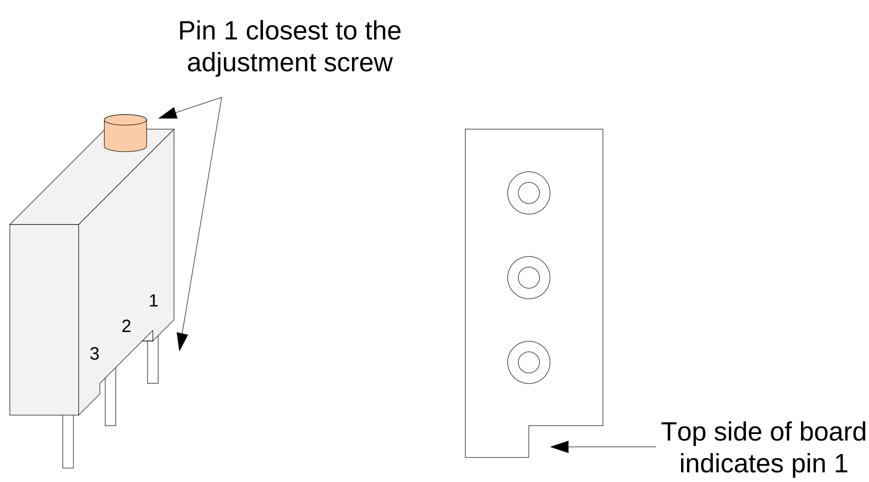


D. Clip the capacitor leads flush with wire cutters using one hand while holding the lead being cut with the other hand. This will prevent sharp wire bits from flying around the room and becoming an eye hazard.

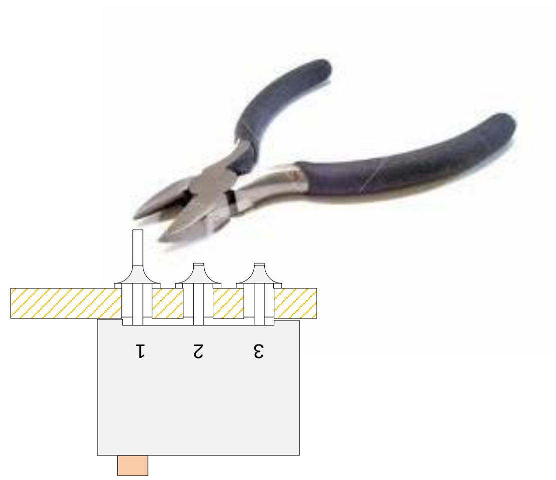


6. Soldering 20-Turn Trimmer Potentiometers

A. Potentiometers are 3-terminal devices composed of a resistive element and a wiper element. On most potentiometers, terminals 1 and 3 are used for the fixed resistor element and terminal 2 is used for the wiper element. In order for the circuit to work properly, potentiometers must be installed onto the PCB correctly. Pin 1 on the potentiometer can be found nearest the adjustment screw and is labeled on the body of the potentiometer. A square pad on the PCB denotes where potentiometer pin 1 is to be inserted.

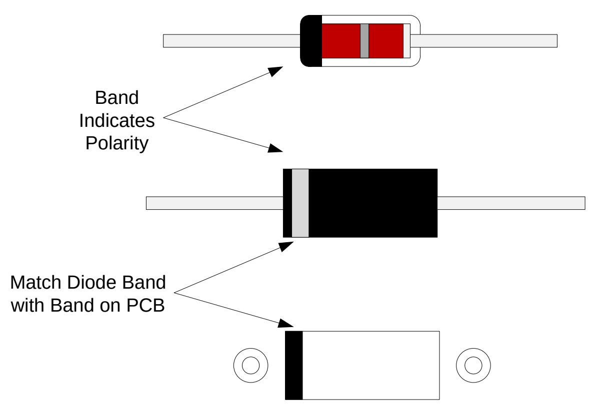


B. The 20-Turn potentiometers will fit flush with the PCB and are soldered in using the same process for a resistor or capacitor. Trim the leads flush with the solder joint.

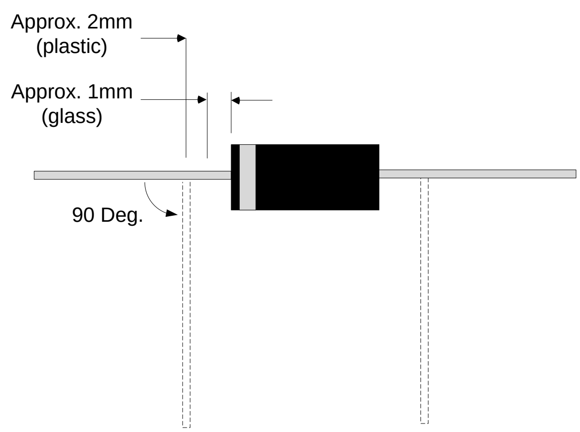


7. Soldering Diodes

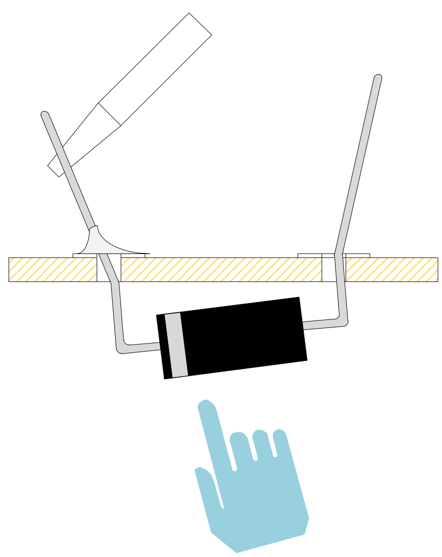
A. Diodes are 2-Terminal devices that allow current to flow in only one direction. They must be installed correctly on the PCB or the circuit will not work and the diode could possibly self-destruct. Diode polarity is always marked with a black or silver band at one end.



B. Bend leads approximately 1mm-2mm from the diode body at a 90 degree angle. You want the diode lead spacing to be just slightly longer than the PCB hole spacing so the diode stays in place when fully seated against the board. This will make leads easier to solder. Use caution when bending leads on glass body diodes as they are easily damaged.



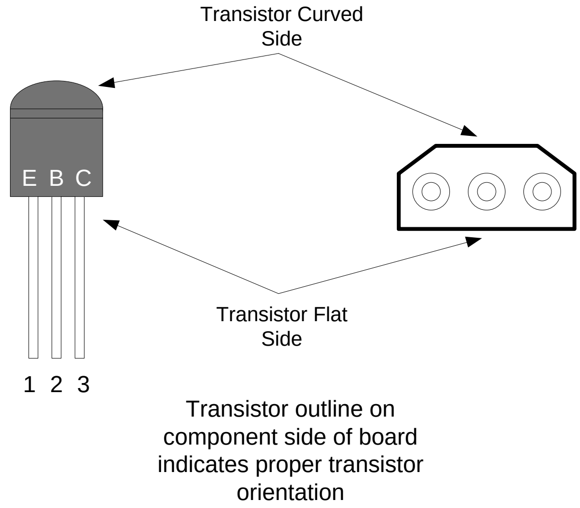
C. Solder one diode lead to the PCB first, then check that the diode is fully seated against the board. If the diode is fully seated, solder the other lead. If it isn't, push lightly against the diode body while applying the soldering iron to the soldered diode lead so that the solder melts and the diode seats against the board. Then solder the remaining lead. <u>Be careful not to burn your finger as the resistor will get hot while soldering.</u>



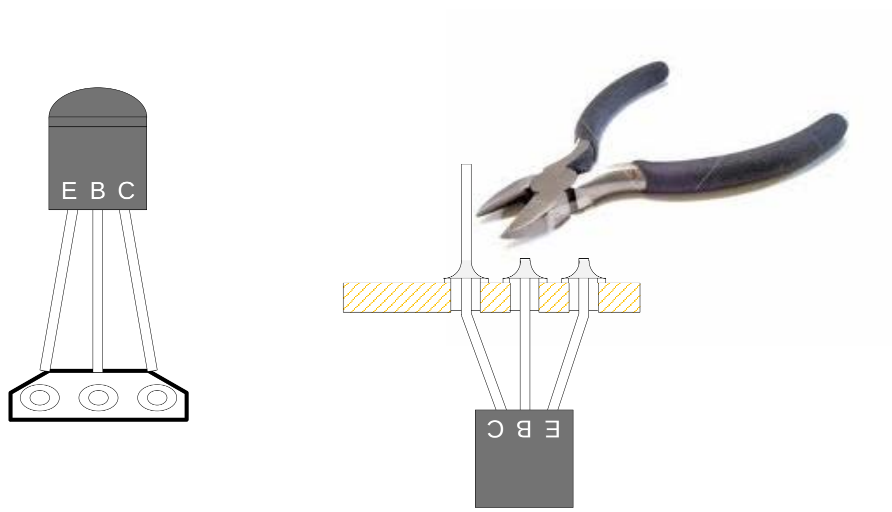
D. Clip the diode leads flush with wire cutters using one hand while holding the lead being cut with the other hand. This will prevent sharp wire bits from flying around the room and becoming an eye hazard.

8. **Soldering Small Transistors**

A. Transistors are 3-Terminal devices that must be installed correctly on the PCB or they can self-destruct when power is applied. The transistors used in this project are plastic TO-92 case style with the following standard pin-out:

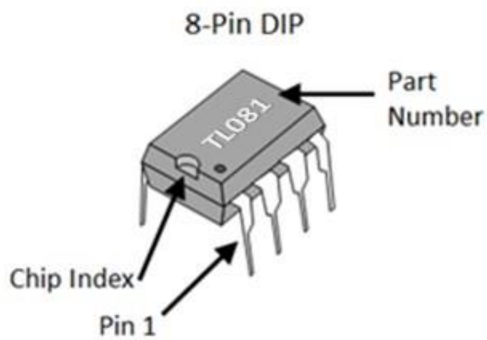


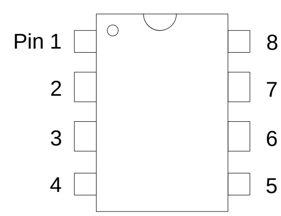
B. Orient the transistor according to the silkscreen diagram on the component side of the board. Allow about 6mm space between the PCB and the bottom of the transistor. The transistor PCB pads are spaced wider than they are at the transistor case to make soldering easier. Simply spreads leads 1 and 3 apart and insert into the holes in the PCB. Transistors are soldered in using the same process for a resistor or capacitor. Trim the leads flush with the solder joint.

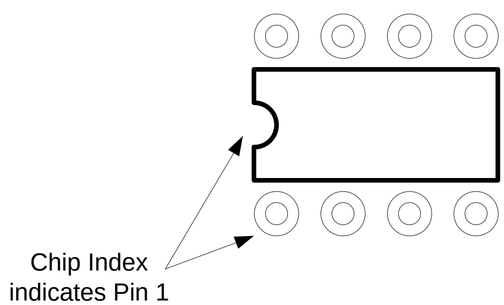


9. **Soldering Integrated Circuits**

A. Integrated circuits take many different forms, but the most common through-hole IC packages are the 8-pin DIP, 14-pin DIP, and the 16-pin DIP. Integrated circuits have an index mark that indicates where Pin-1 of the IC can be located. The index mark can be a dot, an embossed circle, or a notch near pin one of the IC. ICs must be installed correctly on the PCB or they can self-destruct when power is applied.

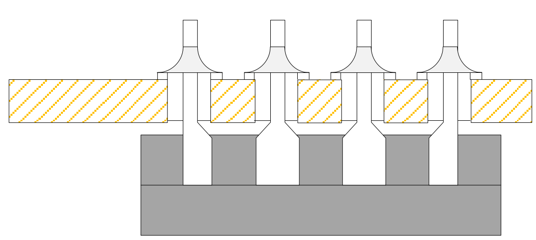






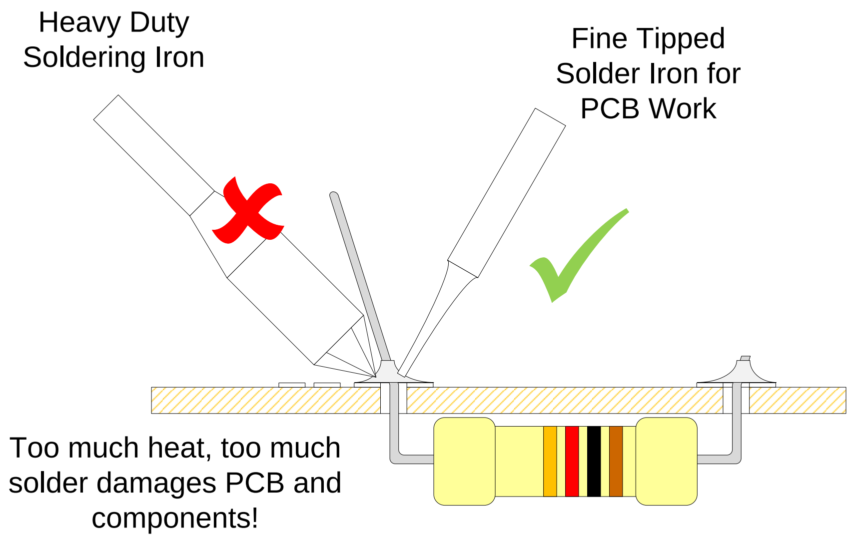
B. Orient the IC according to the silkscreen diagram on the component side of the board. Align the IC pins with their hole in the PCB and carefully press the IC all the way down. Check carefully while inserting the IC that a pin doesn't get folded up under the IC body. Verify that all pins are sticking up through the trace side of the PCB. Bend Pin 1 and Pin 5 outward slightly to make sure the IC remains in place while soldering, then solder all remaining pins in sequence. It is usually not necessary to trim the IC leads.

Trimming IC leads is optional

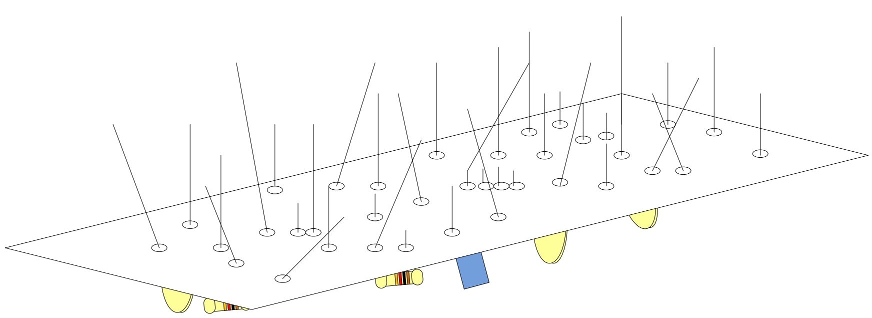


10. General Soldering Tips

A. A fine-tipped soldering iron and .8mm diameter rosin core solder are recommended.



B. A brightly lit workspace with plenty of room for the PCB, soldering station, parts, and schematic (printed or on a laptop) is strongly recommended.
C. A 3X or 5X optical lens is recommended to closely inspect parts and connections after the PCB is completed.
D. The light blue body and small size of 1/4W 1% resistors makes it difficult to distinguish the individual colors of the 5-band color code. The kit includes a color code card for reference, but it is highly recommended that you verify the resistor value with an Ohm Meter before soldering the part in place.
E. Regularly clean the soldering iron tip with a wire sponge (recommended), wet synthetic sponge, or wet paper towel. Try to keep the soldering iron tip bright and clean with no solder blobs or flux dross adhering to it while soldering components on the PCB.
F. Insert no more than 3 or 4 parts on the board at one time. It is very difficult and frustrating to maneuver the soldering iron for the best position while keeping all the parts from falling out.

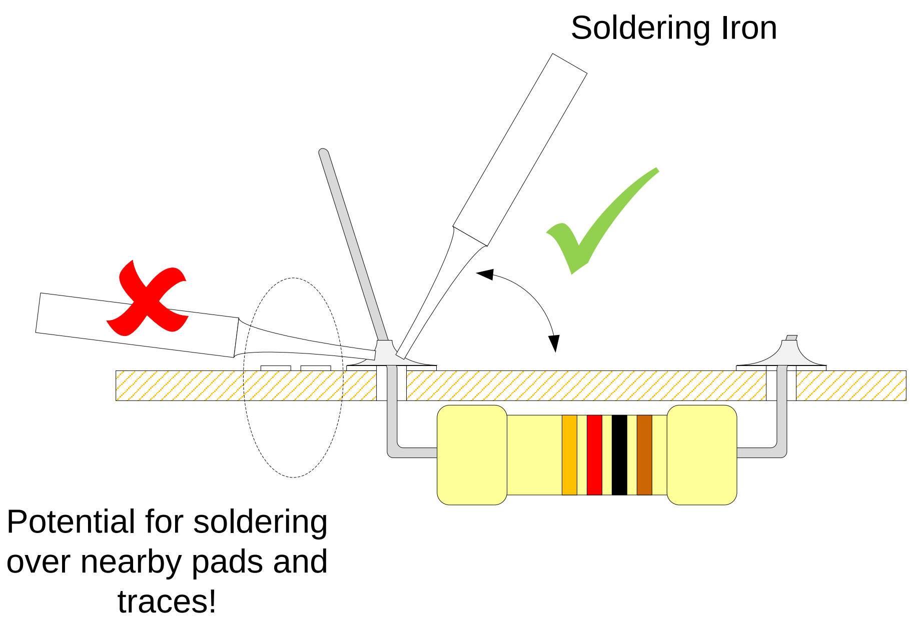


Does not look like a fun job.

G. Solder the parts that lay closest to the board first (glass diodes, resistors) and then move up to the larger components. Below is a suggested IC's, small capacitors, then transistors, and finally potentiometers, large capacitors, and power transistors. This allows the board to rest mostly flat while soldering making the job much easier.

H. For each part type (resistors, capacitors, etc.) start with the lowest part numbers first and work your way up. This helps avoid missing a part and having to go back and solder it in later. It also helps avoid soldering a part in the wrong position.

I. Keep the soldering tip at a high angle to the PCB when soldering parts on the board. This helps avoid unwanted solder bridges to nearby pads.



J. Before applying the soldering iron, look for a location to place the tip that is farthest way from other pads if possible. This helps avoid unwanted solder bridge to nearby pads.

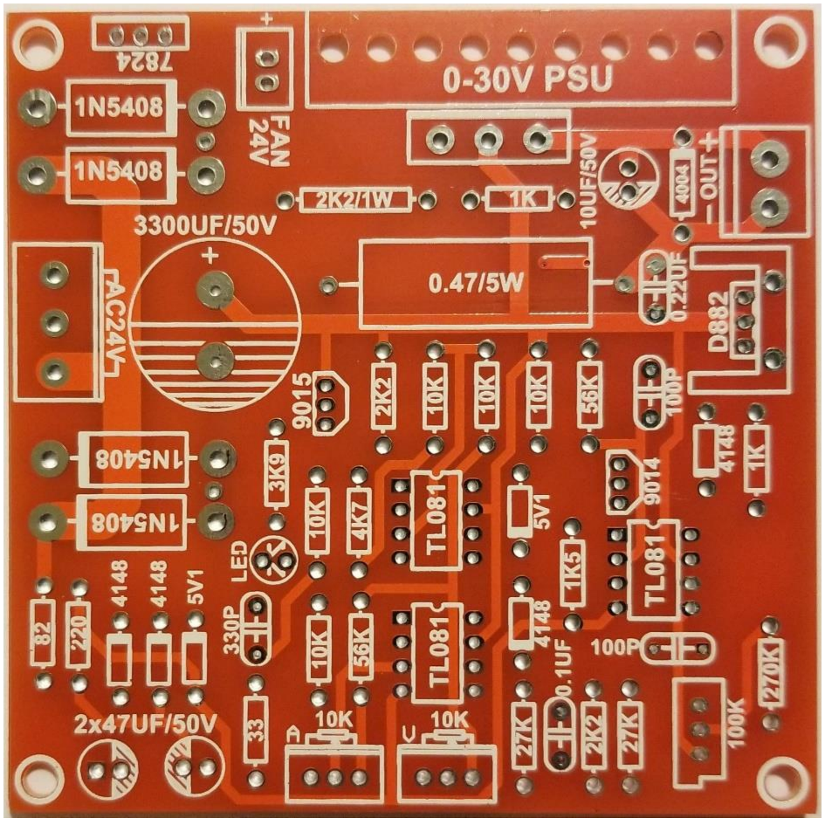
K. Take a break every 30 minutes. Soldering is hard work. Your hand will be steadier and your eyes more focused if you rest for 5 minutes between assembly steps.

L. Don't try doing PCB work on an empty stomach or without any sleep. Get something to eat and drink, then do the work. Get a good night's sleep and then do the work. Your hand will be steadier, your eyes more focused, and your mind more relaxed and less prone to frustration or panic.

Work slowly and carefully. Check and double-check before applying the iron.

Step-By-Step Assembly

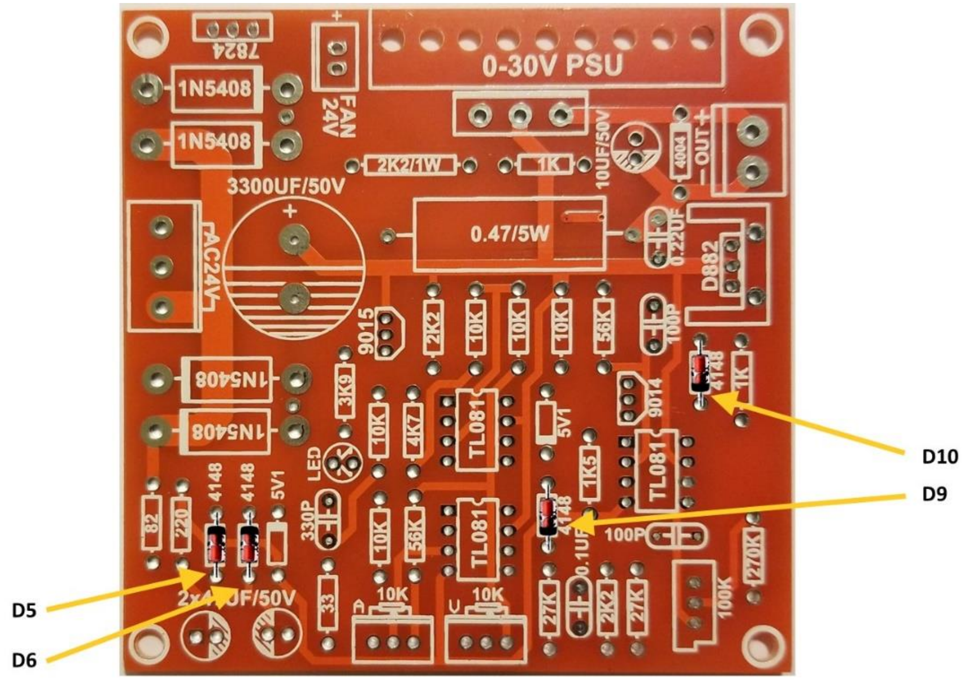
1. Review the circuit board layout to familiarize yourself with the silkscreen markings on the component side of the board. Note that the silkscreen contains part numbers/values instead of reference numbers like R1 or C4. The assembly steps will include both when needed.



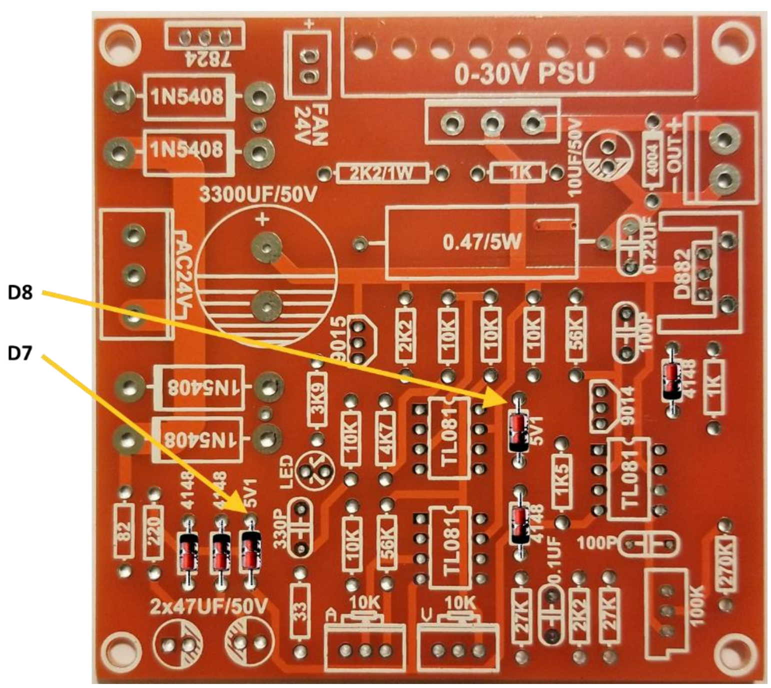
2. Remove the glass diodes from the bag containing the diodes, small transistors, MLC capacitors, small electrolytic capacitors, connectors, and trimmer resistor. You will need to find the two Zener diodes and set them aside. The four remaining 1N4148 diodes will be marked with the numbers 41 and 48 one above the other. You may need a magnifier to distinguish them.

3. The 1N752 diodes will be marked with "5V" and "6T", or "5V" and "5T" one above the other. The Zener diodes will be slightly larger than the 1N4148 diodes. You may need a magnifier to distinguish them. Set them aside for use in Step 5.

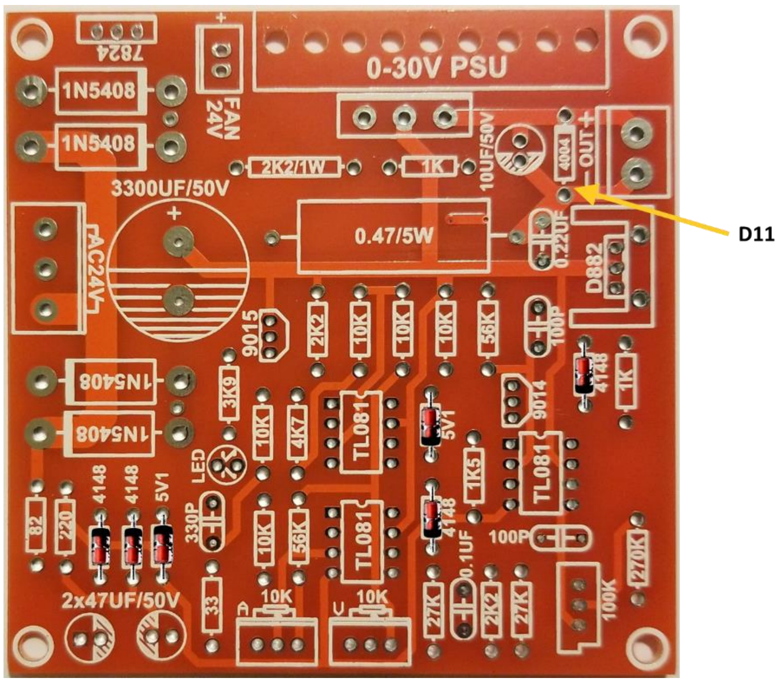
4. Insert and solder five 1N4148 diode in the locations marked "4148". **Be sure to observe the polarity markings on the PCB.**



5. At some point the Power Supply design was changed from 5.1V Zener diodes to 5.6V Zener diodes, but the PCB silkscreen was not changed and still contains the description of the 5.1V Zener diode. Insert and solder two 1N752 diode in the locations marked “5V1”. **Be sure to observe the polarity markings on the PCB.**



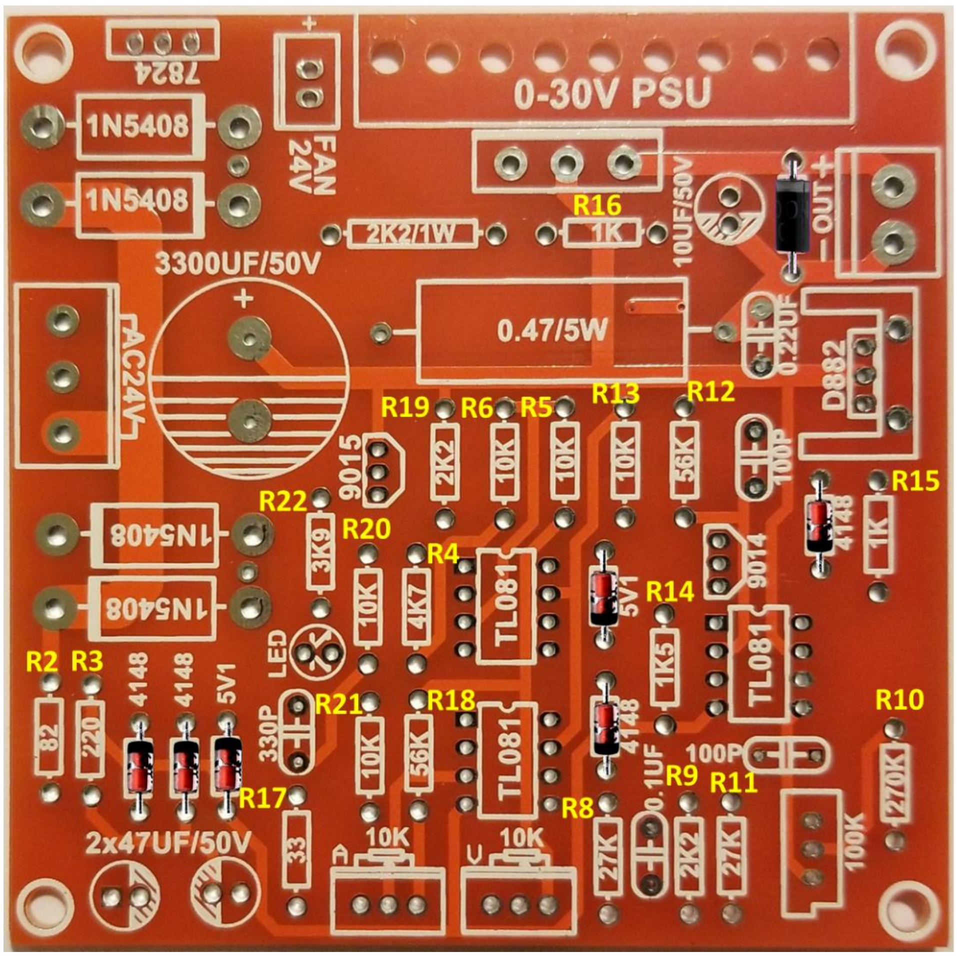
6. Insert and solder one 1N4004 diode in the location marked “4004”. **Be sure to observe the polarity markings on the PCB.**



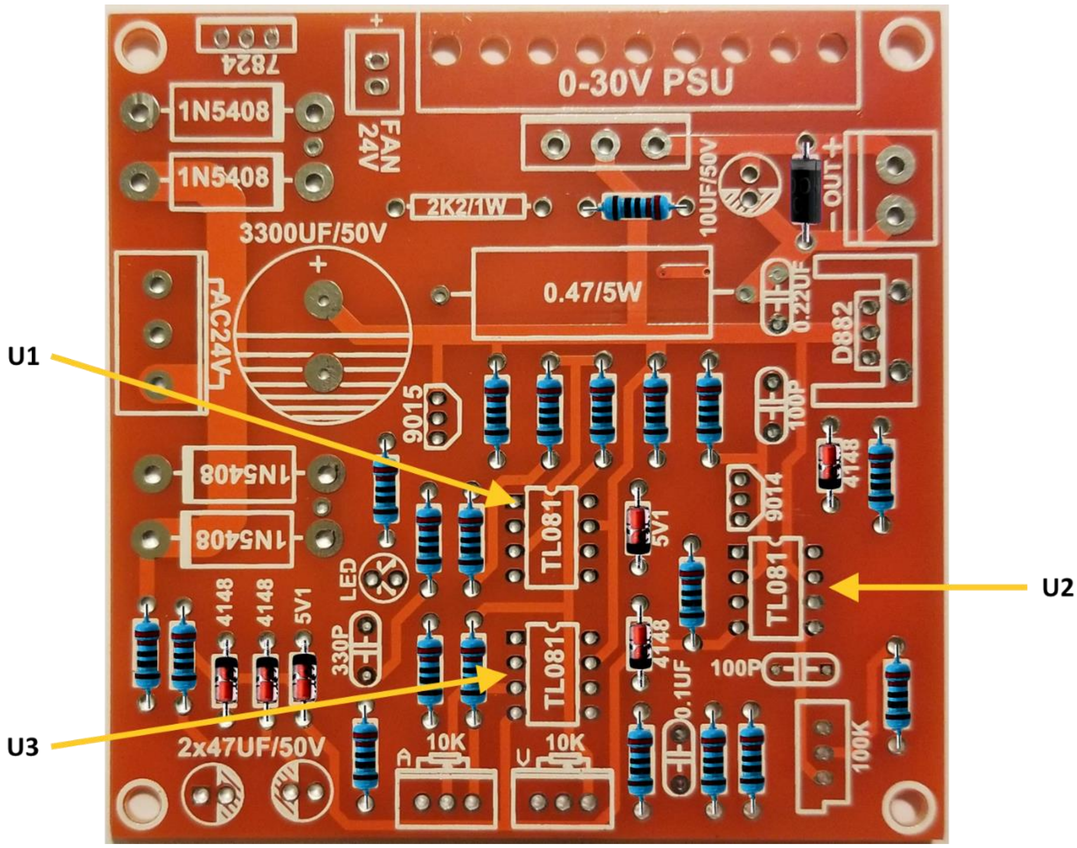
7. Insert and solder twenty 1/4W resistors in the locations marked with their resistance value. You can solder install them in any order that seems natural to you. **Be sure to verify the resistance values with an Ohm Meter before soldering.** A suggested sequence is below:

Schematic Reference	PCB Reference	Part Description
R2	82	82 Ohm 1/4W Resistor
R3	220	220 Ohm 1/4W Resistor
R22	3K9	3.9K Ohm 1/4W Resistor
R17	33	33 Ohm 1/4W Resistor
R20	10K	10K Ohm 1/4W Resistor
R21	10K	10K Ohm 1/4W Resistor
R4	4K7	4.7K Ohm 1/4W Resistor
R18	56K	56K Ohm 1/4W Resistor
R19	2K2	2.2K Ohm 1/4W Resistor
R6	10K	10K Ohm 1/4W Resistor
R5	10K	10K Ohm 1/4W Resistor
R13	10K	10K Ohm 1/4W Resistor
R8	27K	27K Ohm 1/4W Resistor
R12	56K	56K Ohm 1/4W Resistor

Schematic Reference	PCB Reference	Part Description
R14	1K5	1.5K Ohm 1/4W Resistor
R9	2K2	2.2K Ohm 1/4W Resistor
R11	27K	27K Ohm 1/4W Resistor
R15	1K	1K Ohm 1/4W Resistor
R10	270K	270K Ohm 1/4W Resistor
R16	1K	1K Ohm 1/4W Resistor



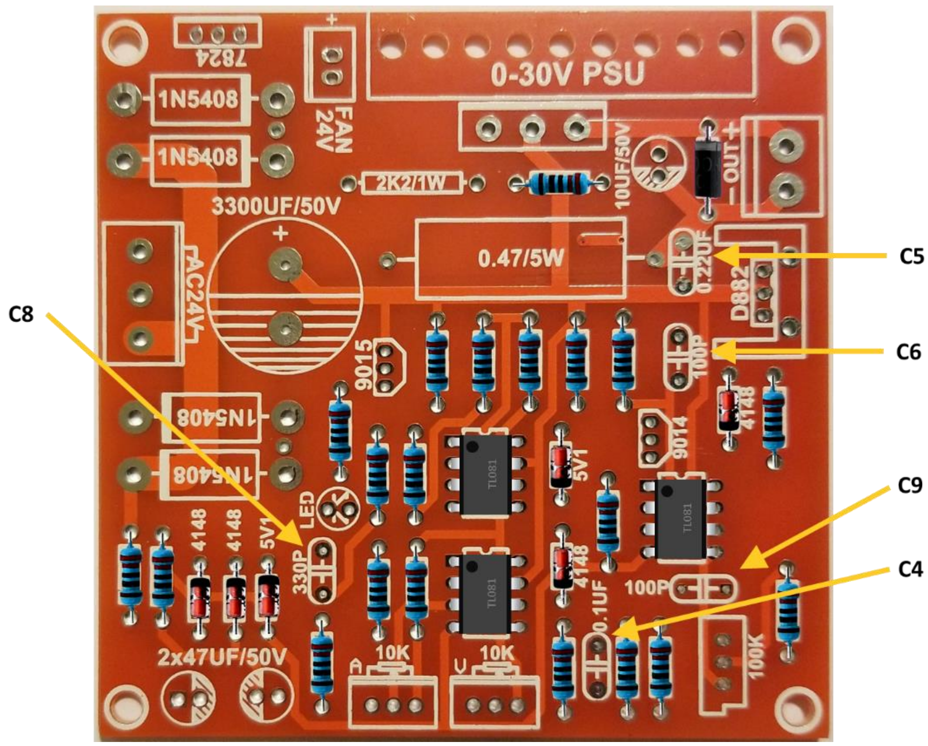
8. Insert and solder U1, U2, and U3 in the locations marked “TL081”. **Be sure to observe the registration markings on the PCB and match them with the IC registration mark before soldering.**



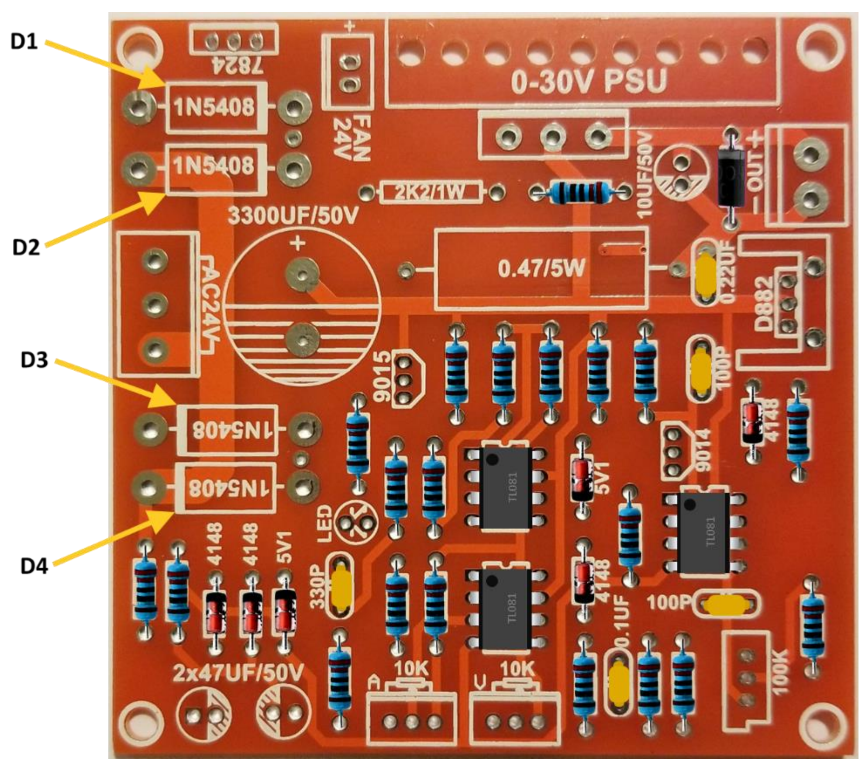
9. Insert and solder MLC Capacitors C4, C5, C6, C8, and C9 in the locations marked with their capacitance value. The value of each capacitor along with the capacitor code marked on the capacitor body is indicated below:

Schematic Reference	PCB Reference	Capacitor Code	Capacitor Value
C4	0.1UF	104	0.1uF
C5	0.22UF	224	0.22uF
C6	100P	101	100pF
C8	330P	331	330pF
C9	100P	101	100pF

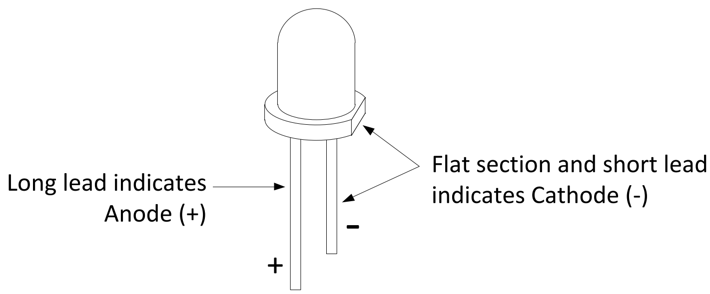
Match the capacitor code printed on the MLC capacitor body with the PCB Reference in the chart above to ensure each capacitor is soldered in the correct location.

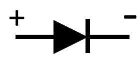


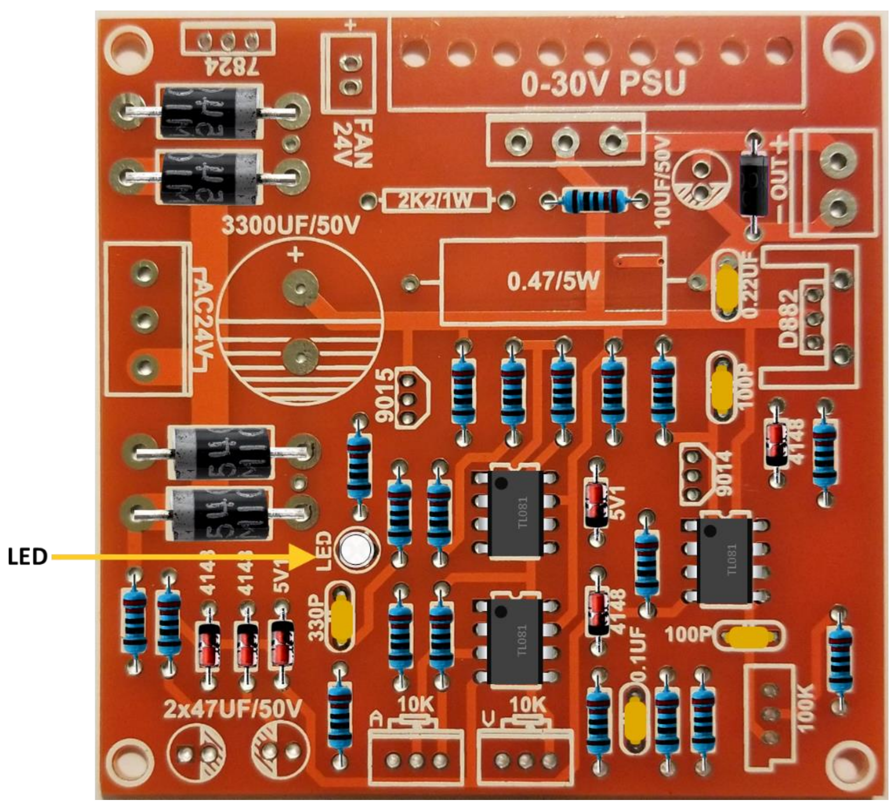
10. Insert and solder D1, D2, D3, and D4 in the locations marked “1N5408”. **Be sure to observe the polarity markings on the PCB.**



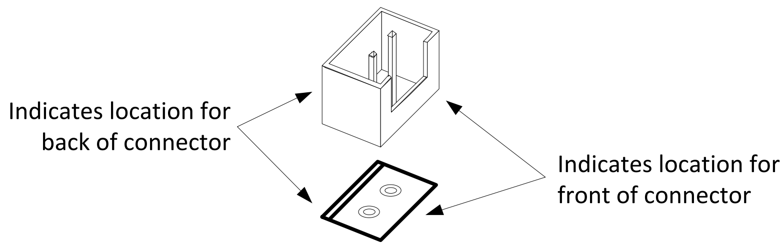
11. If you intend to install the variable power supply in an enclosure, skip this step. Otherwise, insert and solder the LED into the position indicated. **Be sure to observe the polarity indicated on the PCB.** If installing the power supply in a case, attach wires from the PCB to the LED after the LED is mounted.

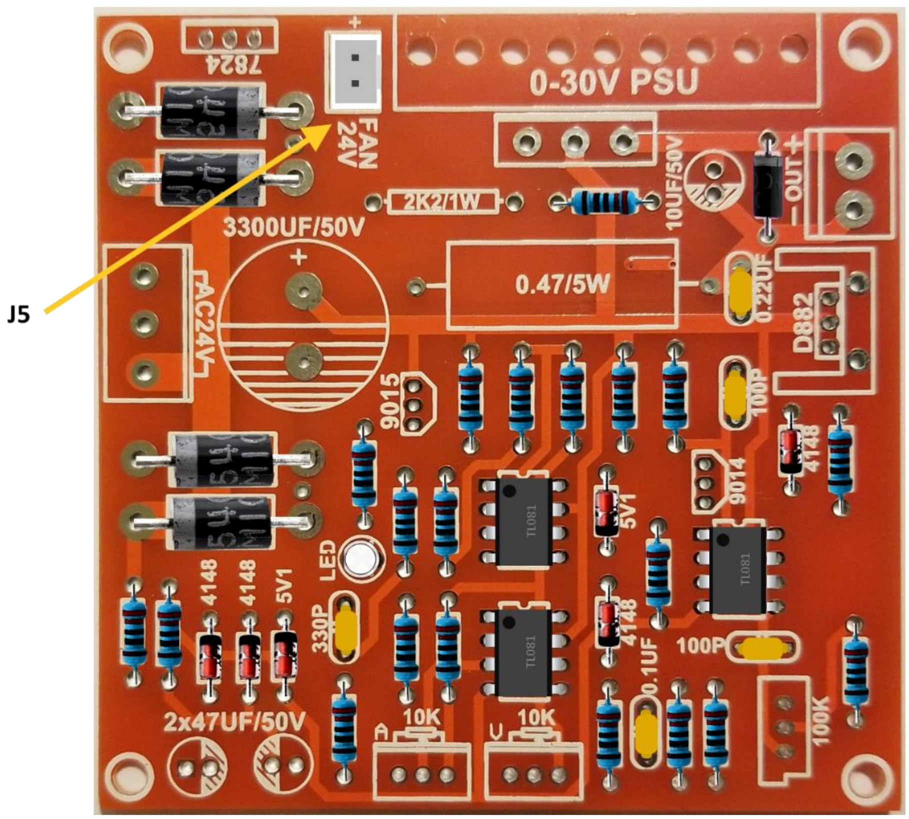






12. Insert and solder PCB connector J5 in the position indicated. **If you intend to install the variable power supply in an enclosure, skip to Step 14.**

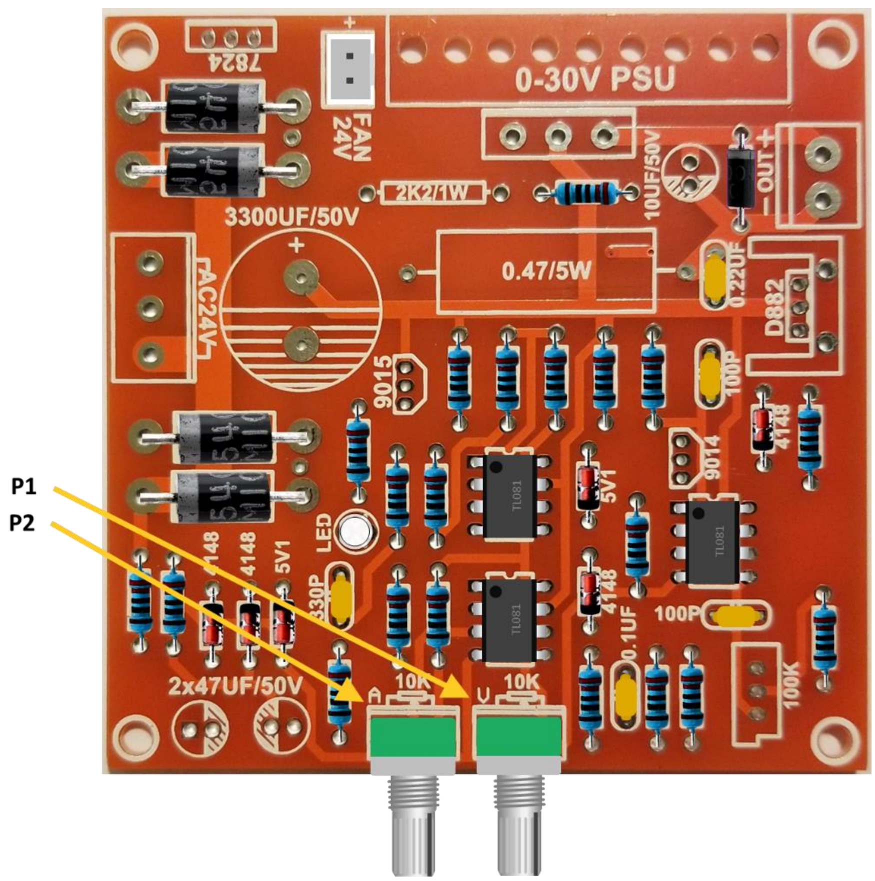




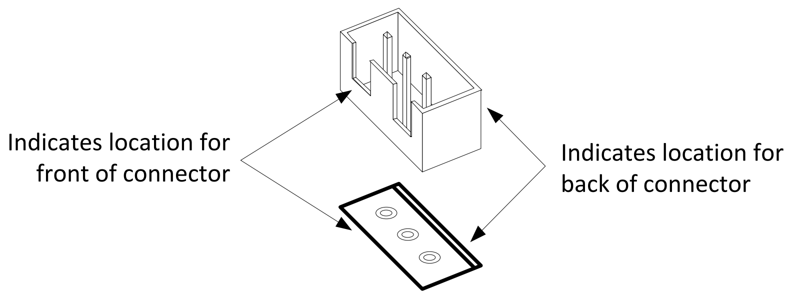
13. Insert and solder potentiometers P1 and P2. **After completing this step, skip to Step 15**.

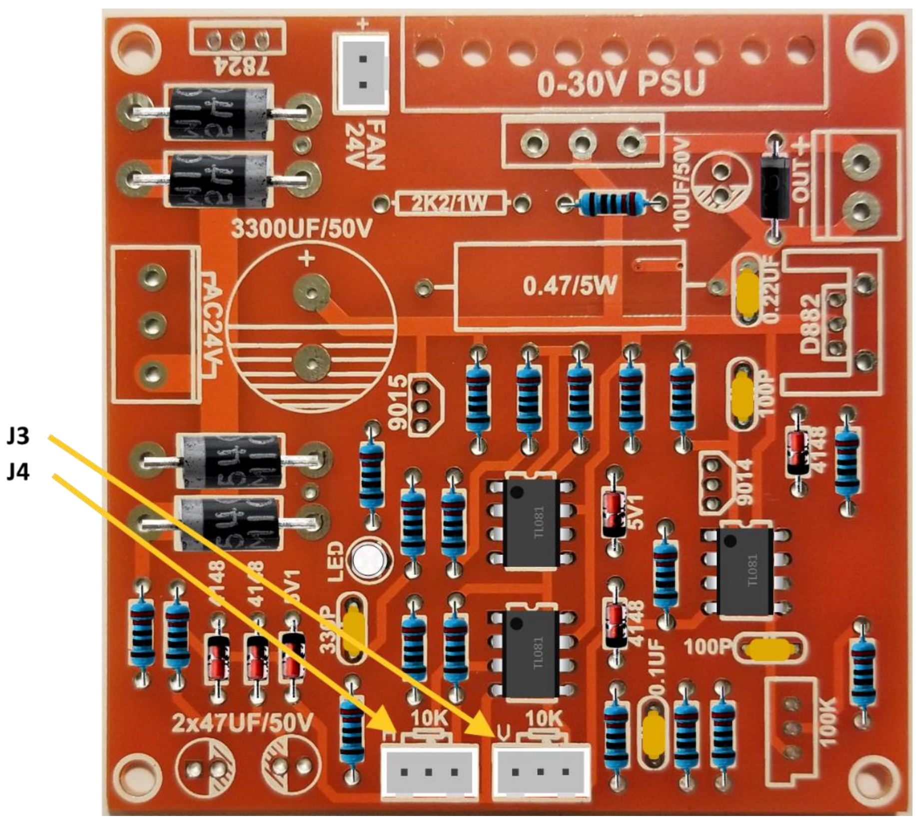
    NOTE: It is highly recommended that the variable power supply be housed in a suitable enclosure. It is assumed that most users will need to mount the Voltage and Current controls with better spacing than is provided on the PCB, which will require the use of the included PCB connectors and cables. Each illustration that follows will have PCB connectors for P1 and P2 instead of potentiometers.

    Skip this step if you will not be mounting the potentiometers to the PCB.

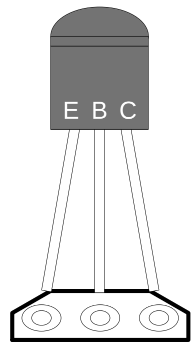


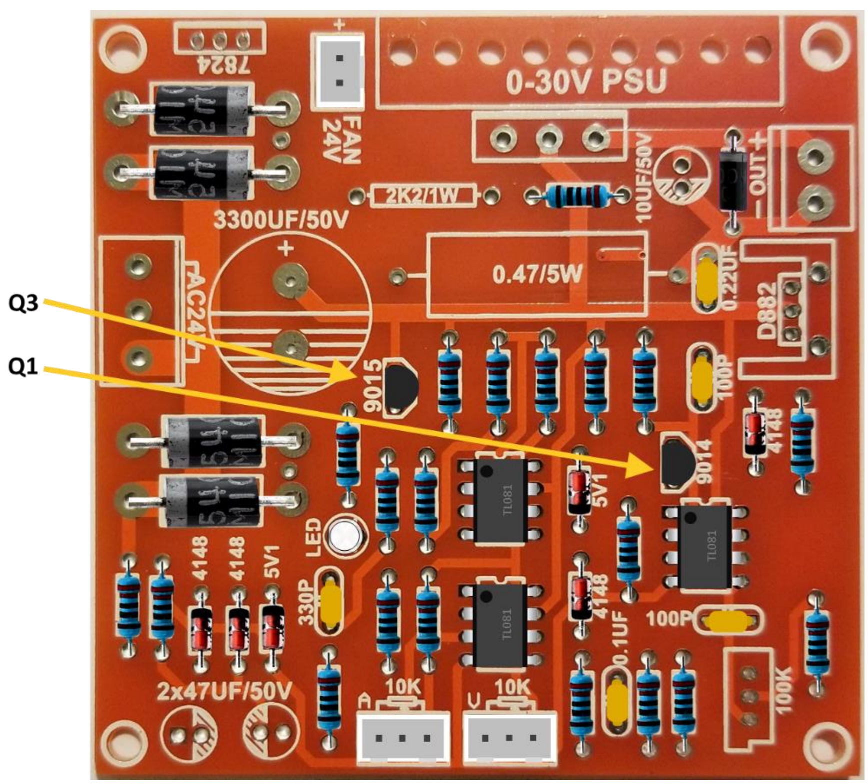
14. If you intend to install the power supply in an enclosure, insert and solder PCB connectors J3 and J4 in the positions indicated. The PCB indicates the direction that the connectors must be installed in as described below.



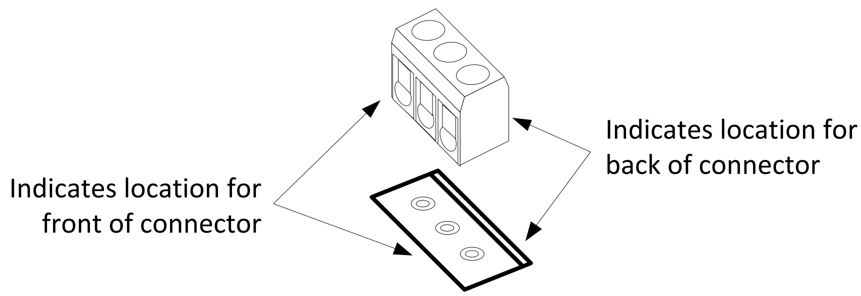


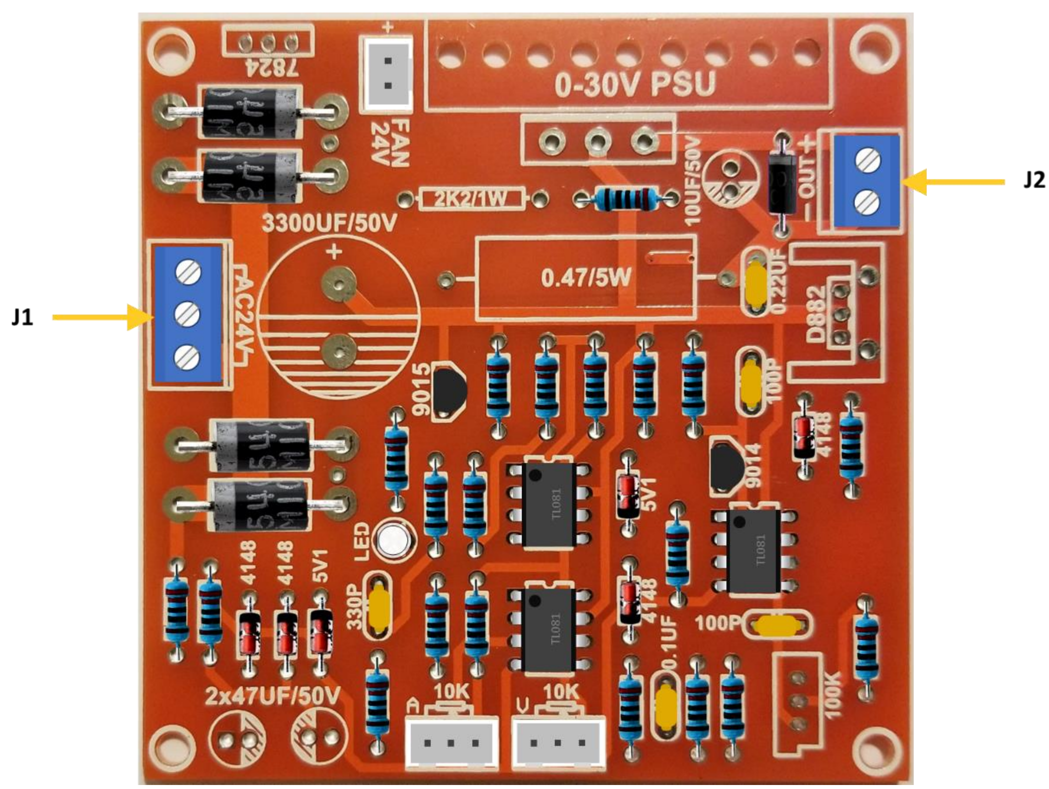
15. Insert and solder Q1 (SS9014) and Q3 (SS9015) in the positions marked “9014” and “9015” respectively. **Be sure to observe the orientation indicated on the PCB.**



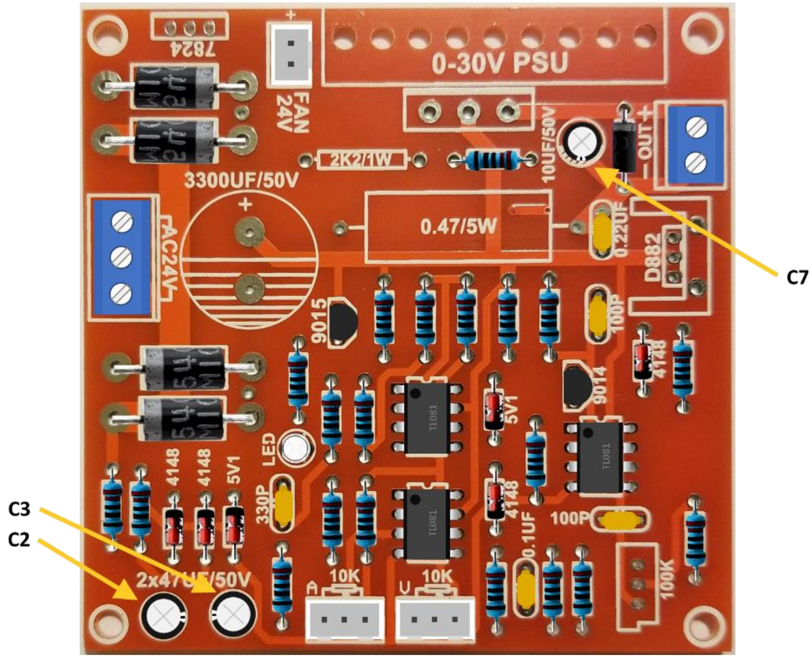


16. insert and solder PCB connectors J3 and J4 in the positions indicated. The PCB indicates the direction that the connectors must be installed in as described below.

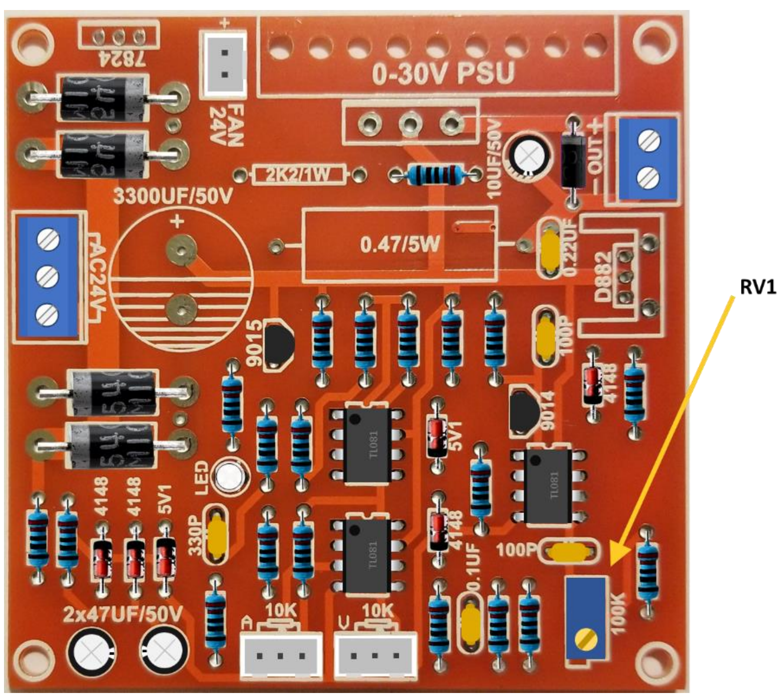




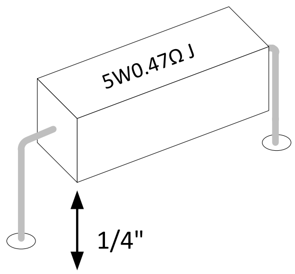
17. Insert and solder capacitors C2 (47uF), C3 (47uF), and C7 (10uF) in the positions indicated. **Be sure to observe the polarity indicated on the PCB (i.e. shaded area is negative).**

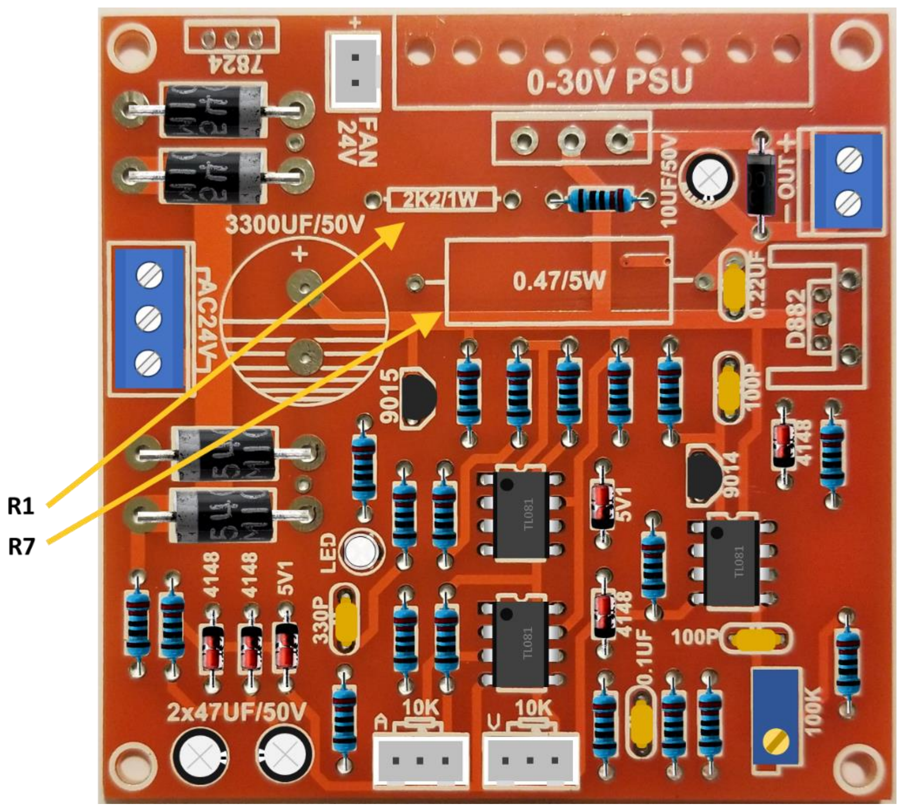


18. Insert and solder trimmer resistor RV1 at the position indicated. **Be sure that the adjustment screw is closest to the PCB board edge as shown below.**

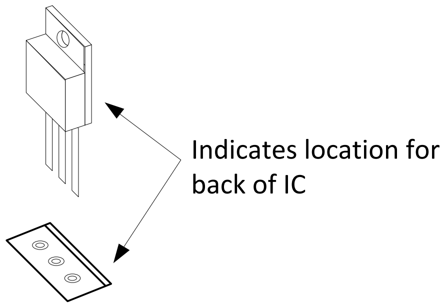


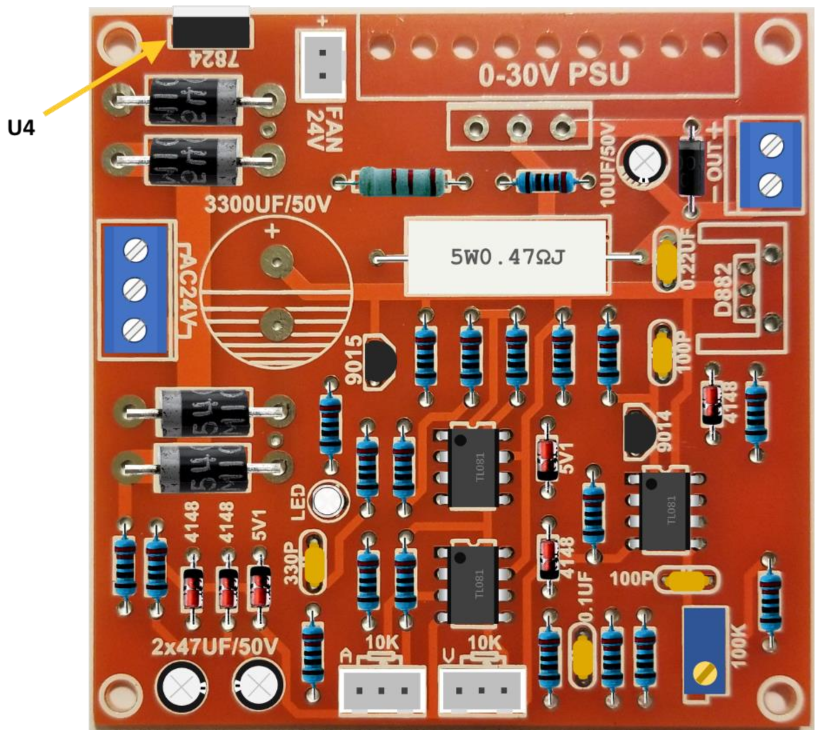
19. Insert and solder resistors R1 (2.2K 1W) and R7 (0.47 Ohm 5W) in the positions indicated on the PCB. **In order to prevent heat buildup underneath these resistors that can damage the PCB, it is highly recommended that at least 1/4" space between the PCB and the bottom of the resistor be provided when soldering.**



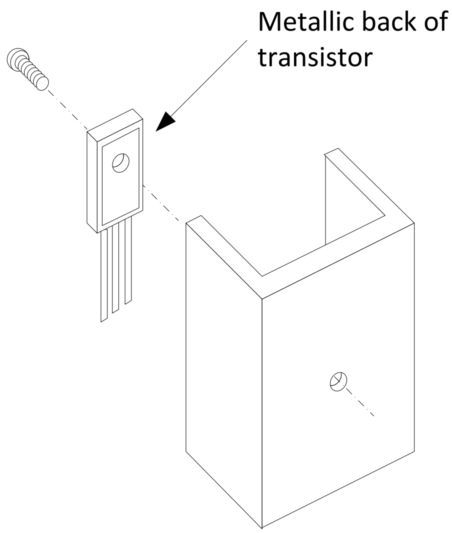


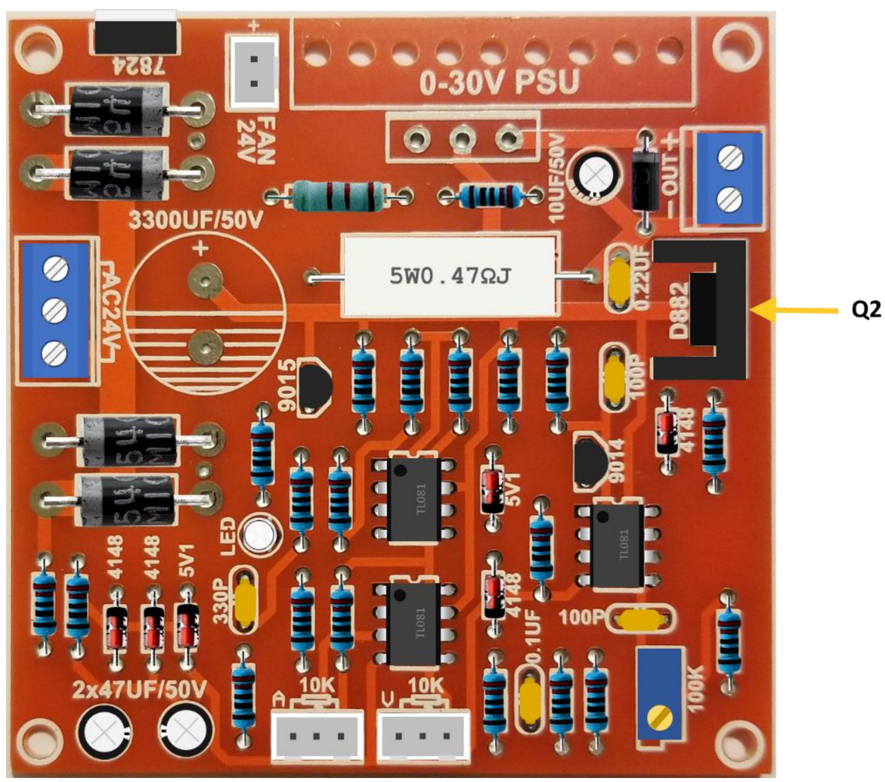
20. Insert and solder U4 (7824 Regulator) in the position indicated on the PCB. **Be sure to orient U4 according to the legend as described below.**



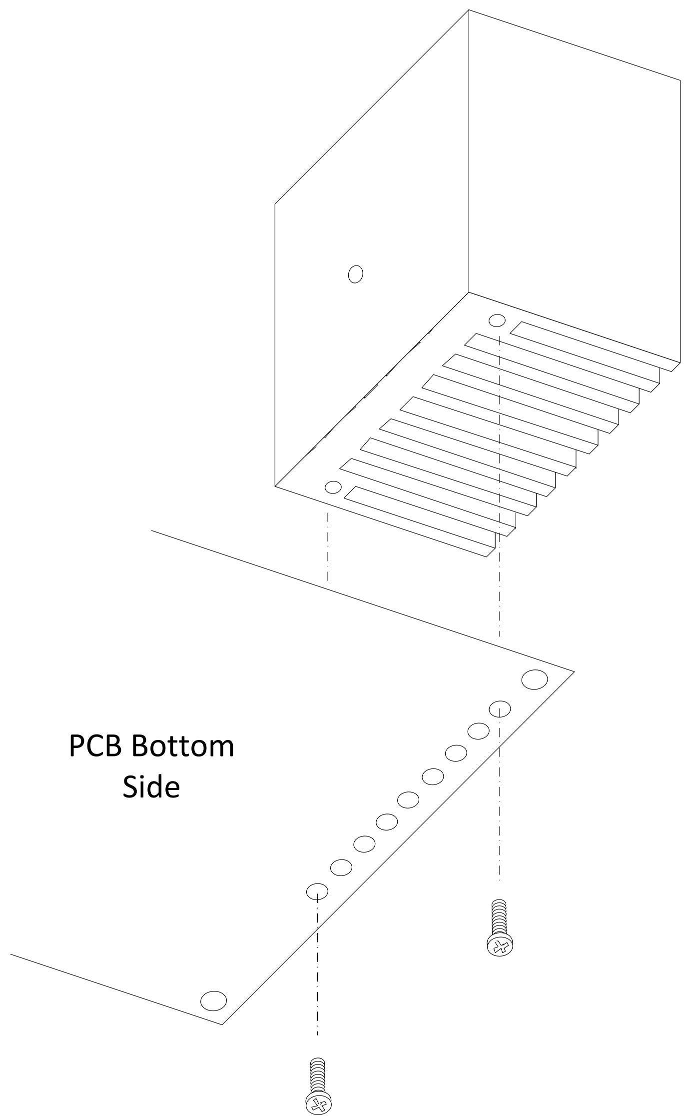


21. Attach Q2 (2SD882) to small heat sink HS1 as shown below using one small machine screw. To optimize heat transfer, apply some silicone grease or clear heatsink compound to Q2 before attaching it to the heat sink. Do not tighten the screw fully until after Q2 and the heat sink pins have been installed and soldered. After soldering all pins, tighten the machine screw.

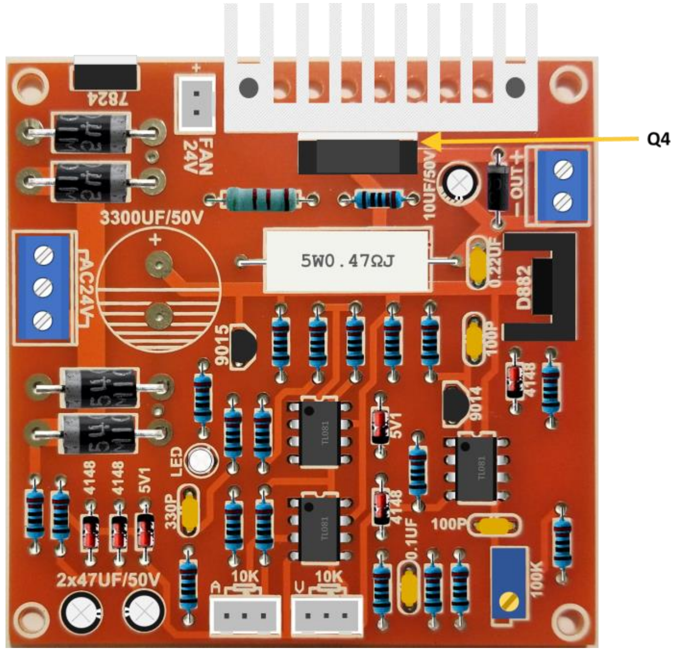




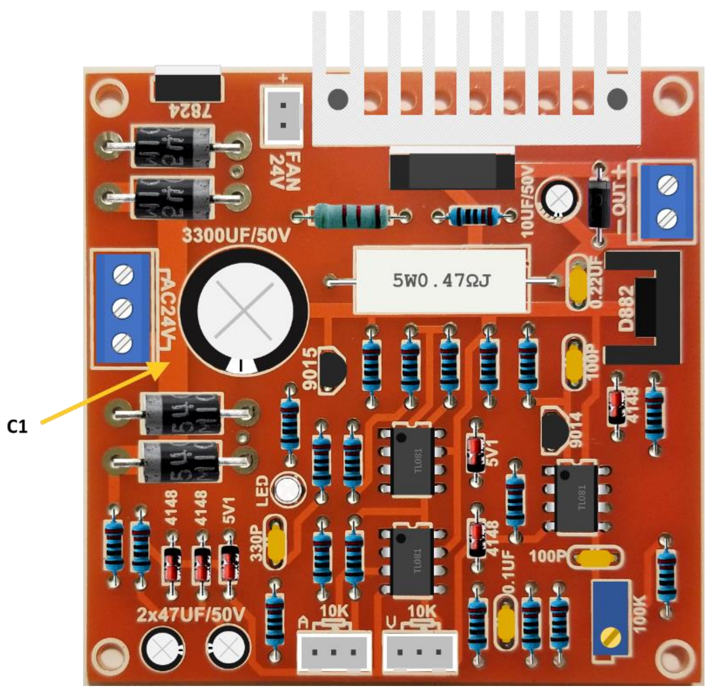
22. Attach the large heat sink (HS2) to the PCB as shown using two machine screws. The machine screws are not self-taping so a good amount of force will be required to thread them into the heat sink, and care will need to be taken to avoid damaging the screw head. Use the proper sized cross-point screw driver with a large comfortable handle.



23. Insert Q4 (2SD882) into the position marked on the PCB and secure it to the large heat sink (HS2) using one machine screw. Tighten firmly and solder Q4 onto the PCB.

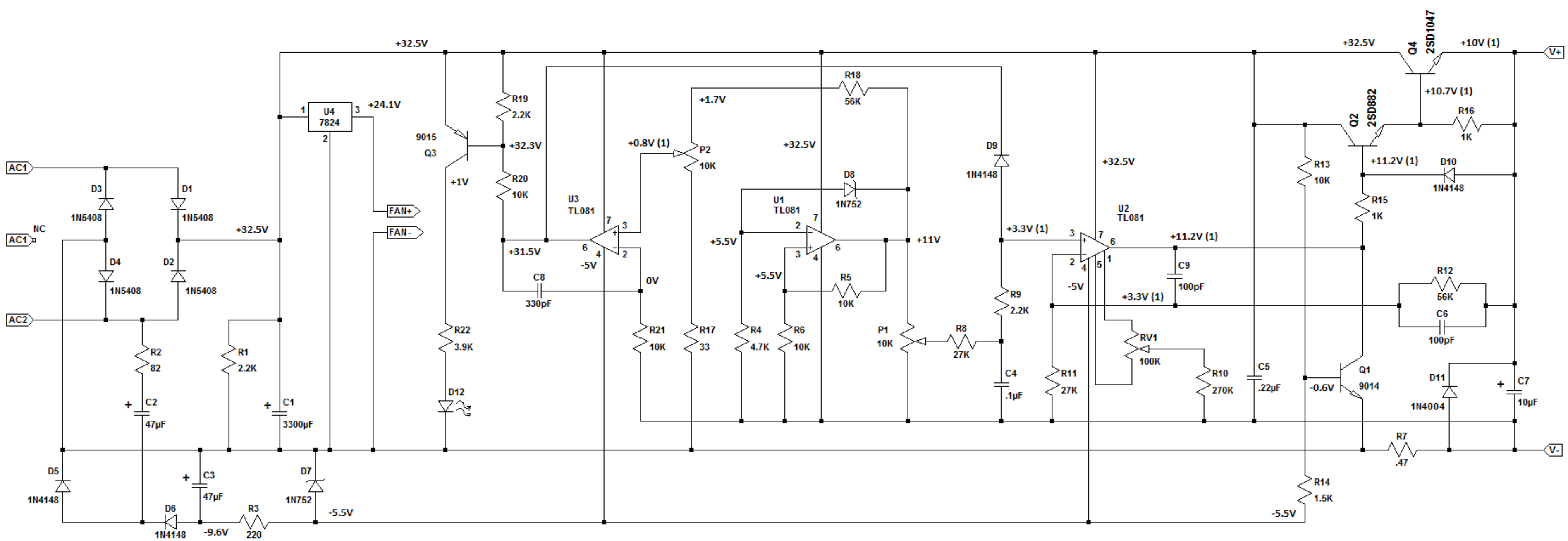


24. Insert and solder C1 (3300uF) in the position indicated on the PCB. Be sure to observe the polarity indicated on the PCB (i.e. shaded area is negative).



25. The power supply assembly has been completed. Proceed with the steps described in the Operation and Maintenance document.

Schematic Diagram



(1) All voltages above measured with P1 adjusted for 10V output and P2 approximately 1/2 rotation.